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LAND SUITABILITY FOR CERTAIN CROPS IN INTERFERENCE AREA BETWEEN EL-FAYOUM AND THE NILE VALLEY.

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ABSTRACT

The interference area adjacent to the Nile Vally and El-Fayoum governorate is the most prospective area for agriculture expansion in Egypt. Soil properties and land suitability for cultivation of various crops are the main steps for this goal.

To realize this object 16 soil profiles representing the main physiographic units have been selected. The main physiographic units are old terraces, Young terraces, alluvial fan basin, alluvial plain (locally terraced) and alluvial plain.

The well defined soil parameters used to estimate the suitability index for each crop were; texture class including gravel percent, soil depth, salinity status, calcium carbonate and gypsum content, drainage conditions and slope. The essential requirements for 15 crops have been included in the calculated indices.

The current suitability of the representative physiographic units could be categorized into three. Suitability classes (i.e moderately suitable (S2) alluvial fan basin, alluvial plain ["locally terraced" and alluvial plain], marginally suitable (S3, old terraces and young terraces), permanently not suitable (N2, rock land).

By matching the parametric approach of land indices and the requirements of some specific crops, the obtained data of soil suitability for some selected crops (15 crops). Which are presented for the studied soils developed on the identified physiographic units as land suitability guide tables, show that the current suitability Classes were moderately suitable (S2) or marginally suitable (S3) for most of the selected crops, without major land improvements (salinity and sodicity). The potential suitability classes differed according to the

satisfaction condition between different properties of soils developed on the studied physiographic units and plant requirements.

INTRODUCTION

The agricultural expansion in the desert areas is one of the main objects of the national plan to meet the food requirement for the tremendous increase in population. The interference area between El-Fayoum governorate and the Nile Vally is the most prospective area due to its agricultural potentialities. Physical and chemical properties of the studied soils and suitability for various crops are the main steps towards land use planning in an economic and efficient way.

According to Said (1962 and 1990) and Euroconsult (1992) the area between El-Fayoum governorate and the Nile Vally covers part of the old terraces originated from Pleistocene and Recent deposits. The northern part is mostly Miocene limestone mixed with the aeolicen sands.

The aridic climatic is prevailing in this area; the mean annual temperature is 21.95° and the annual rainfall range between 0.0 – 2.5 mm/year. Relative humidity is fluctuating between 42.6 and 67.4 %.

The water resources of these area mainly from the River Nile through Bahr Wahby canal. Some parts of these are feeded from underground wells over the Nubian sandstone reservoir in western Desert.

Several contributions for land evaluation have been published from various aspects which are given numerous terms, Storie (1964); FAO (1976), Sys and Verhye (1978), Sys et al (1991 and 1993) have been published dealing with land evaluation criteria for rural purposes and irrigation practices.

The main object of this work aims at estimating the suitability indices for the previously mentioned crops taking into consideration the limiting soil criteria.

MATERIALS AND METHODS

Sixteen soil profiles were selected to represent the main physiographic unit in the interference area between El-Fayoum governorate and the Nile Vally (Latitude 29° 11′ 27″ and 29° 34′ 00″ North, and longitudes 30° 51′ 27″ and 31° 16′ 20″ East) Fig (1).

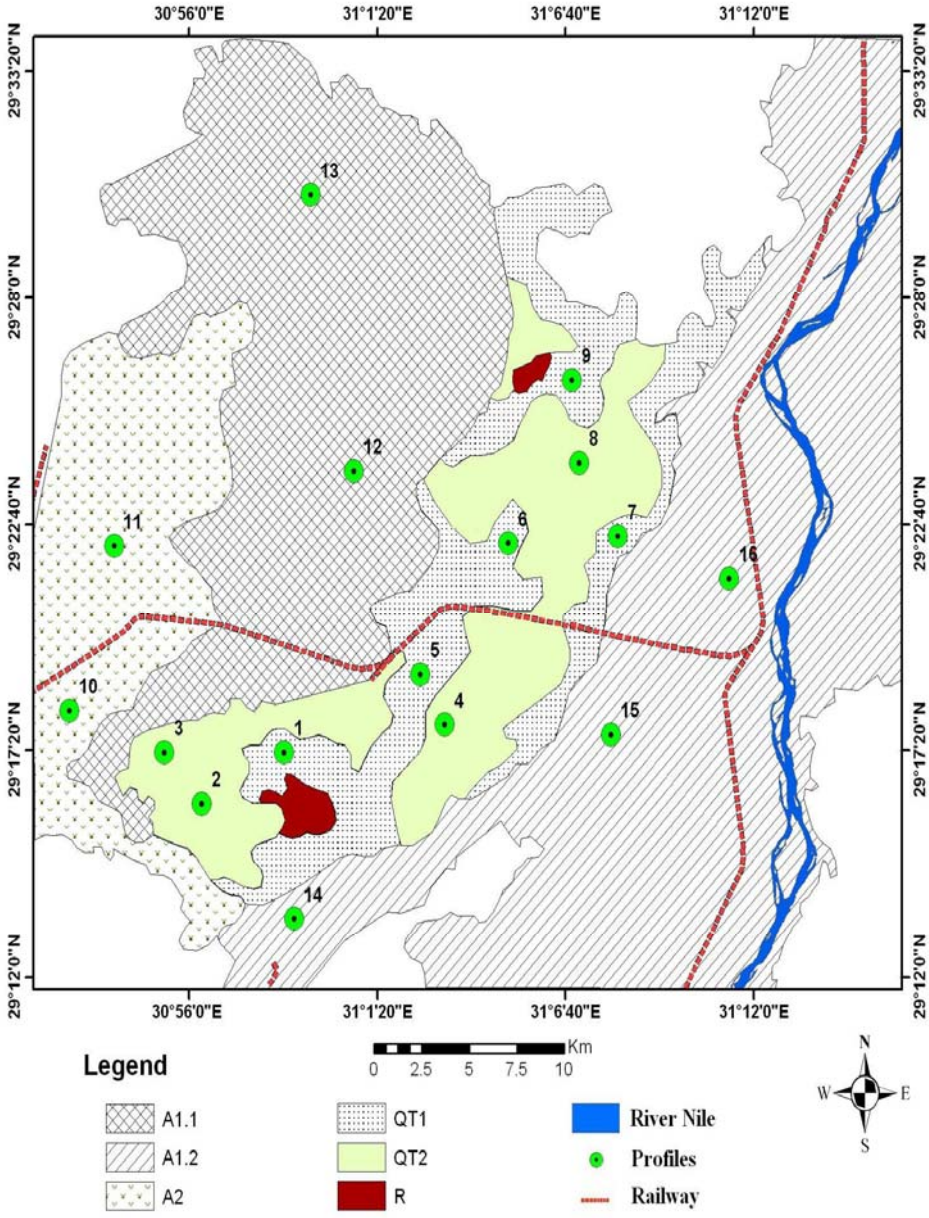

Figure (1): Physiographic units and location soil profiles of the study area.

Morphological description of the representative soil profiles was undertaken according to the criteria given by (FAO 1990). The collected soil samples were air dried, crushed and sieved through a 2 mm sieve and kept for physical and chemical analyses (Table 1).

- Particle size distribution was determined by the international pipette method according to Kilmer and Alexander (1949).
- Calcium carbonate content was determined using the calcimeter (Richards 1954).
- Gypsum content was determined by acetone according to (Richards 1954).
- Organic matter content was determined using the modified Walkly and Black method (Jackson 1973).
- Soil reaction was determined using pH meter (Jackson 1973).
- Total salinity was determined through measurement of the electric conductivity "EC" of extracts (Jackson 1973).

Table (1): Partiele size distribution, textural classes, Gypsum, O.M and $CaC0_3$, contents of the studied soil profiles.

Physiographic unit	Profile No.	Depth (cm)	Gravel %	Sand%		Silt %	Clay %	Texture	O.M. g/kg	$CaCo_3$ g/kg	Gypsum g/kg	pH	EC (dS/cm)
				Coarse Sand	Fine Sand								
Old Terraces	1	0-25	10.0	5.80	78.50	7.30	8.40	LS	3.8	153.0	11.0	7.39	41.30
		25-75	3.5	14.30	71.90	6.50	7.30	LS	2.7	102.0	11.0	7.43	26.60
		75-120	0.0	15.30	65.20	4.20	15.30	SL	1.3	73.0	12.0	7.28	56.04
		120-	0.0	9.50	70.00	7.90	12.60	SL	0.1	86.0	13.5	7.56	20.90
	5	0-25	25.0	7.20	70.70	5.90	16.20	SL	3.4	75.0	21.7	7.68	72.20
		25-65	20.0	3.40	69.90	11.30	15.40	SL	1.9	94.0	52.3	7.91	11.65
		65-90	15.0	7.80	69.20	10.40	12.60	SL	1.5	102.0	37.8	8.04	4.79
		90-140	0.0	4.70	57.80	15.10	22.40	SCL	2.2	79.0	18.5	7.97	3.96
	6	0-20	18.0	5.90	73.10	7.80	13.20	SL	3.0	104.0	34.7	7.56	43.30
		20-60	3.0	3.40	84.20	4.90	7.50	LS	2.1	78.0	23.5	7.52	37.70
		60-90	3.5	6.30	81.80	3.90	8.00	LS	1.1	63.0	17.4	7.53	33.80
		90-120	3.0	13.60	72.50	5.20	8.70	LS	1.0	52.0	23.0	7.58	41.30
	7	0-25	15.0	13.00	53.80	10.40	22.80	SCL	6.5	64.0	157.8	7.38	17.70
		25-75	3.0	25.30	57.90	7.50	9.30	LS	3.5	103.0	152.0	7.39	113.20
		75-150	0.0	19.80	64.70	6.40	9.10	LS	2.0	96.0	151.6	7.15	156.60
	9	0-25	2.0	2.90	60.10	17.20	19.80	SCL	4.5	28.0	70.0	7.40	8.37
		25-55	1.0	3.40	77.30	5.30	14.00	SL	2.0	152.0	19.0	7.81	3.78
		55-90	0.0	2.20	47.30	7.60	42.90	C	4.5	39.0	17.0	7.83	4.49
		90-150	0.0	2.50	78.90	6.40	12.20	SL	1.2	105.0	14.0	8.05	4.24

Table (1): Cont.

Physiographic unit	Profile No.	Depth (cm)	Gravel %	Sand%		Silt %	Clay %	Texture	O.M. g/kg	$CaCo_3$ g/kg	Gypsum g/kg	pH	EC (dS/cm)
				Coarse Sand	Fine Sand								
Young Terraces	2	0-25	15.00	15.80	74.70	3.20	6.30	SL	2.4	50.0	107.6	7.63	21.5
		25-65	2.00	3.40	78.20	6.40	12.00	SL	1.2	46.0	12.5	7.63	31.90
		65-90	0.00	15.20	71.60	5.70	7.50	LS	1.0	112.0	73.8	7.69	33.70
		90-150	0.00	13.40\	72.10	5.00	9.50	LS	0.5	84.0	107.8	7.76	42.80
	3	0-30	30.00	14.20	70.30	9.20	6.30	LS	3.5	96.0	158.2	7.19	50.90
		30-70	2.00	6.50	77.10	7.30	9.10	LS	2.2	102.0	13.6	7.37	33.70
		70-150	0.00	7.20	79.60	5.20	8.00	LS	1.2	154.0	24.5	7.46	47.80
	4	0-25	15.00	8.30	70.20	7.30	14.20	SL	1.5	76.0	157.7	7.57	8.51
		25-75	0.00	10.20	84.60	2.20	3.00	S	1.2	45.0	35.6	7.65	4.84
		75-110	0.00	15.70	73.50	4.30	6.50	LS	1.0	113.0	52.7	7.75	38.30
		110-	0.00	17.60	71.00	3.50	7.90	LS	0.5	120.0	109.6	7.67	30.30
	8	0-25	15.00	7.30	52.60	15.00	25.10	SCL	4.5	70.0	103.8	7.08	91.60
		25-75	0.00	2.20	62.60	15.20	20.00	SCL	3.2	25.0	100.0	7.01	114.10
		75-150	0.00	3.10	63.30	16.40	17.20	SCL	1.2	32.0	100.0	7.10	87.30
Alluvial Fan Basin	10	0-25	0.00	3.50	28.60	22.30	45.60	C	6.5	32.0	18.0	8.10	0.92
		25-75	0.00	5.40	86.30	3.00	5.3.00	LS	3.4	73.0	17.0	8.19	1.31
		75-150	0.00	2.10	88.20	2.50	7.20	LS	1.2	54.0	16.0	8.26	1.68
	11	0-25	0.00	3.45	27.24	25.80	43.51	C	6.0	15.3	15.0	7.52	9.78
		25-65	0.00	2.50	25.00	26.30	46.20	C	7.7	12.8	12.0	8.00	6.21
		65-90	0.00	2.85	26.89	22.46	47.80	C	6.5	13.6	13.5	7.77	4.42
		90-150	0.00	3.65	26.05	20.15	50.15	C	2.3	4.3	23.0	8.00	4.82

Table (1): Cont.

Physiographic unit	Profile No.	Depth (cm)	Gravel %	Sand%		Silt %	Clay %	Texture	O.M. g/kg	CaCoj g/kg	Gypsum g/kg	pH	EC (dS/cm)
				Coarse Sand	Fine Sand								
Alluvial Plain (Locally Terraced)	12	0-30	0.00	5.2	22.77	24.38	47.6	C	14.0	17.9	21.0	7.78	7.44
		30-70	0.00	5	25.25	20.21	45.3	C	8.0	14.3	18.0	7.65	1.10
		70-110	0.00	9.2	21.3	25.2	46.2	C	5.0	13.6	16.0	7.46	6.60
		110-130	0.00	4	23.37	30.38	38.75	CL	1.3	22.1	14.0	7.66	7.64
	13	0-25	0.00	3.4	27.81	22.37	46.37	C	14.5	66.3	16.0	7.43	2.18
		25-60	0.00	5	22.12	25.41	48.2	C	7.6	82.5	18.0	7.58	6.14
		60-90	0.00	4.2	25.17	21.38	50.16	C	5.5	81.6	19.0	7.60	5.76
		90-150	0.00	7	23.76	20.16	52.43	C	3.0	76.4	16.4	7.67	4.52
Alluvial Plain	14	0-25	0.00	5.1	27.21	22.34	45.3	C	18.0	12.8	14.5	7.98	1.30
		25-60	0.00	5	23.26	25.7	47.8	C	8.0	25.6	13.7	7.83	1.54
		60-90	0.00	3.2	16.52	28.6	49.71	C	5.0	21.3	11.5	7.82	1.60
		90-140	0.00	4	26.23	22.3	48.23	C	2.0	17.0	12.0	7.74	1.10
	15	0-25	0.00	2.1	32.74	20.7	44.41	C	16.5	24.0	11.0	7.56	1.86
		25-60	0.00	5	24.25	22.46	46.75	C	9.0	21.5	13.0	7.69	1.92
		60-90	0.00	6.5	23.37	25.34	48.15	C	6.5	17.5	12.5	7.70	1.42
		90-130	0.00	4	22.45	21.74	50.36	C	2.5	13.4	10.0	7.76	1.60
	16	0-25	0.00	4.6	24.9	23.16	47.31	C	17.0	24.6	17.0	7.55	1.91
		25-60	0.00	3	20.91	24.17	49.65	C	7.5	21.7	13.0	7.90	0.70
		60-95	0.00	5.2	27.85	21.85	47.15	C	4.5	20.1	12.0	8.05	8.50
		95-	0.00	7	31.72	20.17	43.24	C	2.1	20.3	11.0	8.47	1.46

Texture legend:

S	Sand	LS	Loamy sand	SL	Sandy loam
SCL	Sandy clay loam	CL	Clay Loam	C	Clay

Land Evaluation

The soil under investigation were evaluated using two systems for land evaluation namely, the land capability classification (LCC) of Sys et al (1991) and soil suitability classification for certain crops (SSCC) based on the concepts outlined by Sys et al (1993).

RESULTS AND DISCUSSION

Land suitability for irrigated agriculture:

Current land suitability:

Current land suitability refers to the suitability for a defined use of land in its present condition, without major improvements (FAO, 1976). It may refer to the present use of land, either with existing or improved management practices, or to a different use. The current suitability of the studied area was estimated by matching between the present land characteristics and their rating outlined by Sys and Verhfeye (1978) and Sys et al. (1991), using" the aforementioned parametric method of storie.

Two orders (S and N), three classes (S2, S3 and N2) and three subclasses (S2xn, S3xn and S3Xyn) were recognized in the studied area. Data of land suitability including rating, kind and degree of limitations, suitability indices and classification of the studied soils within the different physiographic units are illustrated in Table (2). A detailed description of the current land suitability subclasses is given as follows:

- **S2xn:** This subclass occupies an area of about 241880.1 feddans. It represents soils of Alluvial Fan Basin, Alluvial Plain (Locally Terraced) and Alluvial Plain physiographic units. Suitability Index (Ci) values ranged from 62.3 to 67.5 with a mean values of 63.5, 65.6 and 64.7 of the previous physiographic units. This value indicates a moderately suitable class. These soils have a moderate intensity of texture, salinity and alkalinity limitation in Alluvial Fan Basin and Alluvial Plain, and have slight intensity of salinity and alkalinity limitations and moderate intensity of texture limitation in Alluvial Plain (Locally Terraced).
- **S3xn:** This subclass occupies an area of about 24426.8 feddans. It represents the soils of Old terraces physiographic unit. Suitability Index (Ci) values ranged 20.2 to 74.3 with a mean value of 40.5.

This value indicates a marginally suitable class. These soils have a moderate intensity of texture and salinity and alkalinity limitations.

- **S3xyn:** This subclass occupies an area of about 37391.8 feddans. It represents soils of Young terraces physiographic unit. Suitability Index (Ci) values ranged 29.1 to 53.3 with a mean value of 45.9. This value indicates a marginally suitable class. These soils have a slight intensity of texture and gypsum and moderate intensity of salinity and alkalinity limitations.
- **N2:** This class occupies an area about 1665.4 feddans. It represents soils of Rock Land physiographic unit.

Potential land suitability:

A potential suitability term refers to the suitability of units, for a defined use, in their conditions at some future date, after specified major improvements have been completed where necessary (FAO, 1976). Land improvements are activities which cause beneficial change in the qualities of the land itself. They are classified as major or minor land improvements.

A major land improvement is a substantial and reasonably permanent improvement in the qualities of the land affecting a given use. Examples are large irrigation schemes, drainage systems and deep ploughing. A minor land improvement is one which either has a relatively small effect or is non permanent or both or which lies within the capacity of individual farmers or other land users. Exampling are leveling terracing, eradication of persistent weeds and stone clearance.

In the studied area, land improvement is required to correct or reduce the severity of limitations exiting in the area under consideration. Examples are as follows:

a) Leveling of undulating surfaces of high and low dune area,

b) Leaching of salinity and reclamation of alkalinity,

c) Construction of good drainage systems to drain or to lower the saline ground water table in the soils,

d) Application of chemical and organic fertilizers, green manures and soil conditioners to increase soil fertility and improve the physical and chemical soil properties,

e) Application of modern irrigation systems, such as drip and sprinkler, to save irrigation water and prevent the formation or the rise of ground water table, and

f) Construction of natural and/or artificial windbreak to protect the farms and to prevent or reduce the wind erosion and deposition hazard of loose sand, which causes a serious damage to agriculture, as well as to buildings and other existing infrastructures.

Potential suitability of the studied soils, as illustrated in Table (2) indicated the existing of two orders (S and N), two classes (S2 and N2) and two subclasses (S2x and S2sy). A detailed description of the subclasses as follows:

- **S2x:** This suitability subclass represents the soils of Old Terraces, Alluvial Fan Basin, Alluvial Plain (Locally Terraced) and Alluvial Plain physiographic units. The mean Ci values ranged between 54.5 to 69.0. The increasing in such values is due to the Leaching process of salinity and reclamation of alkalinity limitations. The values indicate a moderately suitable class. Soils of this subclass have a moderate intensity of texture which can be lowered by application of chemical and organic fertilizers, green and organic manures and soil conditioners. The coast of these land improvements should be taken into account during the economic analysis.

- **S2xy:** This suitability subclass represents the soils of Young Terraces physiographic units. The mean Ci value 67.3. The increasing in such values is due to the Leaching process of salinity and reclamation of alkalinity limitations. The values indicate a moderately suitable class. Soils of this subclass have a slight intensity of texture and gypsum which can be lowered by application of chemical and organic fertilizers, green and organic manures and soil conditioners. The coast of these land improvements should be taken into account during the economic analysis.

Table (2): Rating of limitation and land suitability of the studied area.

Physiographic Unit	Profile No.	Topography (t)		Wetness (w)		Physical characteristics: Texture (s_1)		Depth (s_2)		$CaCO_3$ (s_3)		Gypsum (s_4)		Salinity & Alkalinity (n)		Suitability index		Suitability and intensity of limitation	
		cs	ps	cs	ps	cs	ps	cs	ps	cs	ps	cs	ps	cs	ps	cs	ps	Current	Potential
Old Terraces	1 5 6 7 9	100.0 100.0 100.0 100.0 100.0 100 0	100.0 100.0 100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0 100.0 100.0	62.5 61.0 60.0 65.6 95.3 68.9	100.0 100.0 100 0 100.0 100.0 100.0	90.3 94.4 93.3 92.S 96.3 93.4	100.0 97.3 98.3 75.0 97.8 93.7	75.0 71.6 36.8 56.3 82.8 64.5	90.0 90.0 90.0 90.0 90.0 90.0	42.3 40.2 20.2 25.6 74.3 40.5	50.8 50.5 49.5 41.0 80.8 54.5	S_3xn Moderate texture and Salinity & alkalinity Slight: $CaCO_3$ and gypsum	S_2x Moderate: texture
Young Terraces	2 3 4 8	100.0 100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0 100 0	100.0 100.0 100.0 100.0 100.0	97.9 85.0 74.1 100.0 89.3	100.0 100.0 100.0 100.0 100.0	96.6 89.0 97.2 97.8 95 2	92.5 87.5 86.2 85.0 87.8	59.0 44.0 85.9 59.4 62.1	90.0 90.0 90.0 90.0 90.0	51.6 29.1 53.3 49.4 45.9	78.7 59.6 55.9 74.8 673	S.lwn Slight: texture and gypsum. Moderate: salinity- & alkalinity.	Six, Slightly: texture and gypsum
Alluvial Fan Basin	10 11	100.0 100.0 100.0	100 100.0 100.0	100.0 100.0 100.0	100.0 100.0 100.0	80.6 75.07 7.8	100.0 100.0 100.0	97.2 100.0 98.6	100.0 100.0 100.0	80.6 85.0 82.8	90.0 90.0 90.0	63.2 63.8 63.5	70.5 67.5 69.0	S2xn Moderate: texture and salinity &	Moderate texture.
Alluvial Plain (Locally Terraced)	12 13	100.0 100.0 100.0	100.0 100.0 100.0	100.0 100.0 100 0	100.0 100.0 100.0	75.0 75.0 750	100.0 100.0 100.0	100.0 95.0 97.5	100.0 100.0 100.0	89.9 89.4 89.7	90.0 90.0 90.0	67.4 63.7 65.6	67.5 64.1 65.8	Slight: salinity & alkalinity. Moderate: texture	Moderate: texture
Alluvial Plain	14 15 16	100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0	100.0 100.0 100.0 100.0	100 0 100.0 100.0 100.0	75.0 75.0 75.0 75.0	100.0 100.0 100.0 100.0 1	100.0 100.0 100 0 100.0	100.0 100.0 100.0 100 0 J	90.0 85.9 83.1 863	90.0 90.0 90.0 90.0 j	67.5 64.4 62.3 64.7	67.5 67.5 67.5 67.5 |	*Sin,* Moderate texture and salinity' & alkalinity	Moderate texture

CS: Current suitability, PS: Potential suitability. S2: Moderately suitable. S3: marginally suitable. N2: Permanently not suitable

Land suitability for specific crops:

Crop requirements, defined by Sys et al. (1993), are put in separate tables for each crop, including four limitation levels and corresponding land classes as well as rating. The landscape and soil conditions used in these tables are topography (t); wetness (w); soil physical conditions (s) including texture, depth, CaCO3 and gypsum; salinity and alkalinity (n) including EC and ESP, and fertility characteristics (f) including apparent CEC, base saturation, sum of basic cations, pH, and organic carbon. Soil physical conditions, salinity and alkalinity, and fertility characteristics of the different physiographic units were matched with the crop requirements of the selected crops. The matching led to the current and potential suitability for each crop using the parametric approach and of land index as mentioned by Sys et al. (1991).

Table (3) summarizes the current and potential suitability of soils developed on the different physiographic units for each crop.

It could be concluded that current and potential suitability of soils developed on the different physiographic units for specific crops can be discussed as follows:

1. Soils of Old terraces:

- **Current suitability:**
  a) Moderately suitable (S2): olives.
  b) Marginally suitable (S3): barley, grape, alfalfa and cowpea.
  c) Currently not suitable (N1): maize, wheat, cabbage, tomato, olives and mango.
  d) Permanently not suitable (N2): barley, groundnuts, maize, sesame, wheat, cabbage, carrots, onion, tomato, olives, mango, guava, grape, alfalfa and cowpea.
- **- Potential suitability:**
  a) Moderately suitable (S2): olives, guava, grape, alfalfa and cowpea.
  b) Marginally suitable (S3): barley, groundnuts, maize, sesame, wheat, cabbage, onion, olives, guava, grape, alfalfa and cowpea.
  c) Currently not suitable (N1): barley, maize, wheat, cabbage, carrots, onion, tomato, alfalfa and cowpea.
  d) Permanently not suitable (N2): carrots and tomato.

Table (3): Land Suitability classification for some specific crops for the studied area.

Physiographic Unit	Profile No.	Field crops			Vegetable crops			Fruit crops			Fodder crops		
		Crop	Suitability Class		Crop	Suitability Class		Crop	Suitability Class		Crop	Suitability Class	
			cs	ps		cs	ps		cs	ps		cs	ps
Old Terraces	1	Barley	N_2	S_3	Cabbage	N_2	S_3	Olive	N_1	S_2	Alfalfa	N_2	S_3
		Groundnut	N_2	S_3	Carrots	N_2	N_1	Mango	N_2	S_3	Cowpea	N_2	S_3
		Maize	N_2	S_3	Onion	N_2	N_1	Guava	N_2	S_3			
		Sesame	N_2	S_3	Tomato	N_2	N_1	Grape	N_2	S_3			
		Wheat	N_2	S_3									
	5	Barley	N_1	N_1	Cabbage	N_2	S_3	Olive	S_3	S_2	Alfalfa	N_1	S_3
		Groundnut	N_2	N_1	Carrots	N_2	N_2	Mango	N_2	N_1	cowpea	N_2	S_3
		Maize	N_2	S_3	Onion	N_2	N_1	Guava	N_2	S_3			
		Sesame	N_2	S_3	Tomato	N_2	N_2	Grape	N_1	S_3			
		Wheat	N_2	N_1									
	6	Barley	N_2	N_1	Cabbage	N_2	S_3	Olive	N_2	S_2	Alfalfa	N_2	S_3
		Groundnut	N_2	S_3	Carrots	N_2	N_1	Mango	N_2	S_3	cowpea	N_2	S_3
		Maize	N_2	S_3	Onion	N_2	N_1	Guava	N_2	S_3			
		Sesame	N_2	S_3	Tomato	N_2	N_1	Grape	N_2	S_3			
		Wheat	N_2	S_3									
	7	Barley	N_2	N_1	Cabbage	N_1	N_1	Olive	N_2	S_3	Airalfa	N_2	N_1
		Groundnut	N_2	N_1	Carrots	N_2	N_2	Mango	N_2	N_1	cowpea	N_2	N_1
		Maize	N_2	N_1	Onion	N_2	N_2	Guava	N_2	S_3			
		Sesame	N_2	S_3	Tomato	N_1	N_2	Grape	N_2	S_3			
		Wheat	N_2	N_1									
	9	Barley	S_3	S_3	Cabbage	N_2	S_2	Olive	S_2	S_2	Alfalfa	S_3	S_2
		Groundnut	N_1	S_3	Carrots	N_2	N_1	Mango	N_1	S_3	cowpea	N_2	S_2
		Maize	N_1	S_3	Onion	N_2	S_3	Guava	N_2	S_2			
		Sesame	S_3	S_3	Tomato	N_2	N_1	Crape	S_3	S_2			
		Wheat	N_1	S_3									
Young Terraces	2	Barley	N_1	N,	Cabbage	N_2	S_3	Olive	N_1	S_2	Alfalfa	N_2	S_3
		Groundnut	N_2	S_3	Carrots	N_2	N_1	Mango	N_2	N_1	cow pea	N_2	S_3
		Maize	N_2	S_3	Onion	N_2	N_1	Guava	N_2	S_3			
		Sesame	N_2	S_3	Tomato	N_2	N_1	Grape	N_2	S_3			
		Wheat	N_2	N_1									
	3	Barley	N_2	N_1	Cabbage	N_2	N_1	Olive	N_2	S_3	Alfalfa	N_2	S_3
		Groundnut	N_2	S_3	Carrots	N_2	N_2	Mango	N_2	N_1	cowpea	N_2	N_1
		Maize	N_2	N,	Onion	N_2	N_1	Guava	N_2	N_1			
		Sesame	N_2	S_3	Tomato	N_2	N_2	Grape	N_2	S_3			
		Wheat	N_2	N_1									
	4	Barley	N_2	N_1	Cabbage	N_1	S_3	Olive	S_3	S_3	Alfalfa	N_2	S_3
		Groundnut	N_1	S_3	Carrots	N_2	N_2	Mango	N_2	N_1	cowpea	N_2	N_1
		Maize	N_2	N_1	Onion	N_2	N_1	Guava	N_2	N_1			
		Sesame	N_1	S_3	Tomato	N_2	N_2	Grape	N_1	S_3			
		Wheat	N_2	N_1									
	8	Barley	N_2	S_3	Cabbage	N_2	S_3	Olive	N_1	S_2	Alfalfa	N_2	S_3
		Groundnut	N_2	S_3	Carrots	N_2	N_1	Mango	N_2	N_1	Cow pea	N_2	S_3
		Maize	N_2	S_3	Onion	N_2	N_1	Guava	N_2	S_2			
		Sesame	N_1	S_2	Tomato	N_2	N_1	Grape	N_1	S_2			
		Wheat	N_2	S_3									

Table (3): Cont.

Physiographic Unit	Profile No.	Field crops			Vegetable crops			Fruit crops			Fodder crops		
		Crop	Suitability Class		Crop	Suitability Class		Crop	Suitability Class		Crop	Suitability Class	
			cs	ps		cs	ps		cs	ps		cs	ps
Alluvial Fan Basin	10	Barley	S_3	S_3	Cabbage	N_1	S_3	Olive	S_3	S_3	Alfalfa	S_3	S_3
		Groundnuts	N_1	S_3	Carrots	N_1	N_1	Mango	N_1	S_3	Cowpea	N_1	S_3
		Maize	N_1	S_3	Onion	N_1	N_1	Guava	N_1	N_1			
		Sesame	S_3	S_3	Tomato	N_1	N_1	Grape	S_3	S_3			
		Wheat	S_3	S_3									
	11	Barley	S_2	S_1	Cabbage	S_3	S_2	Olive	S_2	S_2	Alfalfa	S_2	S_2
		Groundnuts	S_3	S_3	Carrots	N_2	S_3	Mango	N_1	S_3	cowpea	S_3	S_2
		Maize	S_3	S_2	Onion	N_1	S_2	Guava	N_1	S_2			
		Sesame	N_1	S_3	Tomato	S_3	S_3	Grape	S_3	S_2			
		Wheat	S_3	S_1									
Alluvial Plain (Locally Terraced)	12	Barley	S_1	S_1	Cabbage	S_3	S_2	Olive	S_2	S_2	Alfalfa	S_2	S_2
		Groundnuts	S_3	S_3	Carrots	N_1	S_3	Mango	S_3	S_3	Cowpea	S_3	S_2
		Maize	S_3	S_2	Onion	S_3	S_2	Guava	S_3	S_2			
		Sesame	S_3	S_3	Tomato	S_3	S_3	Grape	S_2	S_2			
		Wheat	S_3	S_1									
	13	Barley	S_2	S_1	Cabbage	N_1	S_2	Olive	S_2	S_2	Alfalfa	S_2	S_2
		Groundnuts	N_1	S_3	Carrots	N_1	N_1	Mango	N_1	S_3	cowpea	N_1	S_2
		Maize	N_1	S_2	Onion	N_1	S_3	Guava	N_1	S_2			
		Sesame	S_3	S_3	Tomato	S_3	S_3	Grape	S_3	S_2			
		Wheat	S_3	S_2									
Alluvial Plain	14	Barley	S_2	S_1	Cabbage	S_3	S_2	Olive	S_2	S_2	Alfalfa Cowpea	S_2 S_3	S_1 S_2
		Groundnuts	S_3	S_3	Carrots	N_1	N_1	Mango	S_3	S_3			
		Maize	S_3	S_2	Onion	S_3	S_2	Guava	S_3	S_2			
		Sesame	S_3	S_3	Tomato	S_3	S_3	Grape	S_3	S_2			
		Wheat	S_2	S_1									
	15	Barley	S_2	S_1	Cabbage	N_1	S_1	Olive	S_2	S_2	Alfalfa cowpea	S_2 N_1	S_1 S_1
		Groundnuts	N_1	S_3	Carrots	N_1	S_3	Mango	N_1	S_2			
		Maize	N_1	S_1	Onion	S_3	S_2	Guava	N_1	S_1			
		Sesame	S_3	S_3	Tomato	S_3	S_2	Grape	S_3	S_2			
		Wheat	S_3	S_1									
	16	Barley	S_2	S_1	Cabbage	N_1	S_3	Olive	S_3	S_2	Alfalfa cowpea	S_2 N_1	S_1 S_2
		Groundnuts	N_1	S_2	Carrots	N_1	N_1	Mango	N_1	S_2			
		Maize	N_1	S_2	Onion	S_3	S_2	Guava	N_1	S_2			
		Sesame	N_1	S_3	Tomato	N_1	S_3	Grape	S_3	S_2			
		Wheat	S_2	S_2									

2. Soils of Young terraces:

❖ **Current suitability:**

a) Currently not suitable (N1): sesame, olives and grape.

b) Permanently not suitable (N2): barley, groundnuts, maize, wheat, cabbage, carrots, onion, tomato, olives, mango, guava, grape, alfalfa and cowpea.

❖ **- Potential suitability:**

a) Moderately suitable (S2): olives.

b) Marginally suitable (S3): groundnuts, sesame, cabbage, olives, guava, grape, alfalfa and cowpea.

c) Currently not suitable (N1): barley, maize, wheat, carrots, onion, tomato and mango.

d) Permanently not suitable (N2): carrots.

3. Soils of Alluvial Fan Basin:

❖ **Current suitability:**

a) Moderately suitable (S2): barley, olives and alfalfa.

b) Marginally suitable (S3): maize, sesame, wheat, cabbage, tomato, grape and cowpea.

c) Currently not suitable (N1): groundnuts, carrots, onion, mango and guava.

❖ **Potential suitability:**

a) Highly suitable (S1): barley and wheat.

b) Moderately suitable (S2): maize, cabbage, onion, olives, guava, alfalfa and cowpea.

c) Marginally suitable (S3): groundnuts, sesame, carrots, tomato, mango and grape.

4. Soils of Alluvial Plain (Locally terraced):

❖ **Current suitability:**

a) Moderately suitable (S2): barley, olives and alfalfa.

b) Marginally suitable (S3): maize, sesame, wheat, cabbage, onion, tomato, guava, grape and cowpea.

c) Currently not suitable (N1): groundnuts, carrots and mango.

❖ **Potential suitability:**

a) Highly suitable (S1): barley and wheat
b) Moderately suitable (S2): maize, cabbage, onion, olives, guava, grape, alfalfa and cowpea.
c) Marginally suitable (S3): groundnuts, sesame, carrots, tomato and mango.

5. Soils of Alluvial Plain:

❖ **Current suitability:**

a) Moderately suitable (S2): barley, wheat, olives and alfalfa.
b) Marginally suitable (S3): sesame, cabbage, onion, tomato, guava, grape and cowpea.
c) Currently not suitable (N1): groundnuts, maize, carrots and mango.

❖ **Potential suitability:**

a) Highly suitable (S1): barley, wheat and alfalfa.
b) Moderately suitable (S2): maize, cabbage, onion, olives, mango, guava, grape and cowpea.
c) Marginally suitable (S3): groundnuts, sesame and tomato.
d) Currently not suitable (N1): carrots

REFERENCES

Euroconsult (Egypt, Netherlands international co-operation) 1992: Environmental profile, Fayoum Governorate, Egypt. Al-Shorouk press, Cairo, Egypt.

FAO, 1976: A framework for Land evaluation, Soil Bull., No. 32, FAO, Rome, Italy.

FAO, 1990: Guidelines for soil profile description, FAO, publication, Rome.

Jackson, M.L. 1973: Soil Chemical analysis. Constable and Co. Ltd., India.

Kilmer, V.J. and Alexander, L.T 1949:.Methods of making mechanical analysis of soils. Soil Sci., 68: 15-24.

Richards, L.A. 1954: Diagnosis and improvement of Saline and Alkaline soils. USDA Agriculture handbook No. 60.

Said, R. 1962: The geology of Egypt. Elsevier Publishing Company, Amsterdam and New York, 377 p.

Said, R. 1990: The geology of Egypt. Published for the Egyptian General Petroleum Corporation, Conoco Hurghada Inc. and Repsol Exploracion, S. A. by Balkema, A. A., Rotterdam, Brookfield, The Netherlands.

Storie, R.E. 1964: "Handbook of soil evaluation" Associated Student Bookstore Univ. of California Berkley, California, USA.

Sys, C. and W. Verheye 1978: An attempt to the evaluation of physical land characteristics for irrigation according to the FAO framework for land Evaluation. Int Train Center for post Grad. Soil Sci., Chent, Belgium.

Sys, C., Ranst, E. Van and J. Debavey 1991: Land Evaluation "part I and II, Int Train Center for post Grad. Soil Sci., univ. Chent, Agric. Public. No.7, Gen. Adm. For Dev. Coop., Brussels, Belgium.

Sys, C. E., J. Debavey and F. Beernaet 1993: Land Evaluation "part III Crops Requirements. Agric. Public. No.7, Gen. Adm. For Dev. Coop., Brussels, Belgium.

ملائمة أراضى التداخل بين محافظة الفيوم ووادى النيل لزراعة أنواع معينة من المحاصيل

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تعتبر أراضى التداخل بين محافظة الفيوم ووادى النيل من أكثر المناطق الملائمة للتوسع الزراعى فى مصر – لذلك فإنة للوصول الى هذا الهدف فقد تم دراسة الخواص الطبيعية والكيميائية ثم اختبار مدى ملائمتها للزراعة بصفة عامة ولنمو بعض المحاصيل بصفة خاصة.

وقد أخذ 16 قطاعاً أرضياً تمثل الوحدات الفزيوجرافية الواقعة فى منطقة التداخل بين الفيوم ووادى النيل حيث استخدم فى هذة الدراسة بعض صفات التربة والتى لها تأثير مباشر على نمو المحاصيل واحتياجات المحاصيل تحت الدراسة وتشير نتائج الدراسة الى ما يلى.

وبإستخدام نظم صلاحية الأراضى للاستزراع يمكن اعتبار أن الوحدات الفزيوجرافية فى منطقة الدراسة تتبع ثلاثة أقسام : أراضى متوسطة الصلاحية(S_2) ، أراضى حدية الصلاحية (S_3) ، أراضى عديمة الصلاحية (N) .

وبإجراء توافق بين القيم الكمية المتحصل عليها من أدلة تقيم التربة وتلك الخاصة بإحتياجات بعض المحاصيل فإن نتائج مدى ملائمة التربة لبعض المحاصيل المختارة (15 محصول) يبين أن درجات الصلاحية للتربة بصورتها الحالية كانت متوسطة الصلاحية (S_2) وحدية الصلاحية (S_3) لكل المحاصيل المختارة وبدون إجراء أى عمليات تحسين للتربة. وعلى الجانب الأخر فإن درجات القدرة الكامنة للاراضى تحت الدراسة بعد تحسينها (الملوحة والقلوية) تختلف تبعاً لحالة التوافق ما بين خواص الأراضى المتكون على مختلف الوحدات الفزيوجرافية وإحتياجات المحاصيل المختارة.